

# *Cultivation and Teaching Reform of Professional Talents in Universities Based on the Industry-Education Integration*

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**Abstract:** Faced with the current imbalance between talent supply and talent demand, and the mismatch between talent quality and enterprise requirements, we must conduct a deep reflection and in-depth research on the cultivation of talents integrated with industry and education in colleges and universities (CAU). In this paper, we investigate the current situation of the talent training(TT) in the industry-education integration(IEI) in a university, use data mining technology to dig and analyze the existing problems of the IEI, promote the optimization and teaching reform of the TT in the IEI in a timely manner, and analyze the process of the TT in the IEI with the reform of the TT in the IEI as the main line, and strengthen the improvement of practical ability while focusing on the cultivation of theoretical knowledge of talents, so as to improve the quality of talents in the IEI. Thereby improving the quality of talents integrated with industry-education.

## 1. Introduction

Current higher education development concept is backward, TT and market demand can not dovetail problems, etc. Through the timely discovery of the problems of professional TT in CAU, the right remedy promotes the benign interaction of multiple interest groups such as schools, students and enterprises, realizes the win-win situation of multiple subjects, and promotes the benign development of education reform.

Good research results have been achieved on the TT research of IEI. For example, some studies point out that the reasons for the integration of enterprise production and education should be analyzed from the technical, institutional and cultural levels, and that the implementation of the "double-high plan" must be based on the integration of production and education, and the construction of a mixed ownership "shared factory" should be actively pursued. In order to promote the implementation and construction of the "double-high plan", we must take the IEI as the basis, actively build a mixed ownership "shared factory" model, clear the obstacles in the construction process of the IEI platform, and break up and rebuild the school form, institutional basis, and value

culture to stimulate the main responsibility and endogenous power of enterprises [1]. A scholar pointed out that in the process of vocational education IEI curriculum reform should ensure the effective participation of enterprises, establish a corresponding management system, improve teachers' practical training, and obtain students' teaching experience in time to ensure that multiple subjects jointly participate in the construction of the curriculum system and realize the education and teaching community [2]. In conclusion, education and industry can promote the interests of both sides after joint schooling, and the closely linked cooperation is very beneficial to the economic development of society.

This paper firstly introduces the concept of IEI and the concept of data mining technology, then investigates the current situation of IEI TT in a school in terms of school-enterprise cooperation, assessment and evaluation methods, and teachers, then puts forward corresponding suggestions based on the analysis of these three problems, and finally proposes teaching reform measures from both university and government levels.

## 2. Basic Overview

### 2.1 IEI

The concept of IEI has not been unified from ancient times to the present, and most scholars have divided it into two ways of understanding, one is "industry and education" and the other is "production and teaching", while integration means that the two are combined into one. The term "production" refers to industry, "teaching" refers to the education industry, and "integration" refers to the synthesis of two or more things into one [3]. Through the integration of the research results of many scholars, two major views are collated: one is from the macroscopic understanding, that the IEI is the IEI, learning by doing, learning process also get skills training, not limited to school education, the IEI should involve all the details of life and work. Secondly, it refers to the integration of school-enterprise industry-education, through the two-way interaction between industry and education, to achieve a win-win situation for multiple groups such as universities, enterprises and industries, and then achieve a dynamic balance between supply and demand of human resources [4-5].

### 2.2 Data Mining

In this paper, we need to tap the students of CAU to implement the collision of TT in our university, so we use data mining technology to analyze and organize the relevant data. And the clustering evaluation algorithm is widely used in the teaching field, and the following is the basic formula of the clustering evaluation algorithm [6].

$$I_{norm}(X, Y) = \begin{cases} G(X) + G(Y) - G(X, Y) \\ (G(X) + G(Y)) / 2 \end{cases} \quad (1)$$

Where  $I_{norm}(X, Y)$  is the entropy of the random variables X, Y, and  $G(X, Y)$  is the joint entropy, and the joint entropy value can be calculated by the following equation.

$$G(X, Y) = G(X) + G(Y | X) \quad (2)$$

## 3. Problems of IEI Talent Cultivation

This paper conducts a survey on students of a university, and the questionnaire involves questions related to the TT integrated with industry-education, and the following integrates the

problems existing in the TT integrated with industry-education in the school-enterprise cooperation, evaluation methods, and teacher team construction of the university at present.

### 3.1 School-Enterprise Cooperation

As shown in Figure 1, in the question "Q1: I know the enterprises with which the school cooperates", more than half of the students said they did not know the enterprises with which the school cooperates; and only 20.1% of the students thought they knew the enterprises with which the school cooperates. In the question "Q2: I am satisfied with the communication between the school and the internship company", 50.5% of the students chose "not satisfied" and "not satisfied", indicating that they were not satisfied with the current state of communication between the school and the internship company, while 31.5% of the students chose "not sure if they are satisfied". Only 10.2% of the students said that the enterprises would provide them with pre-internship training. This shows that the implementation of school-enterprise cooperation is not perfect in the process of integrating education with industry, and the communication and publicity mechanisms are not in place.

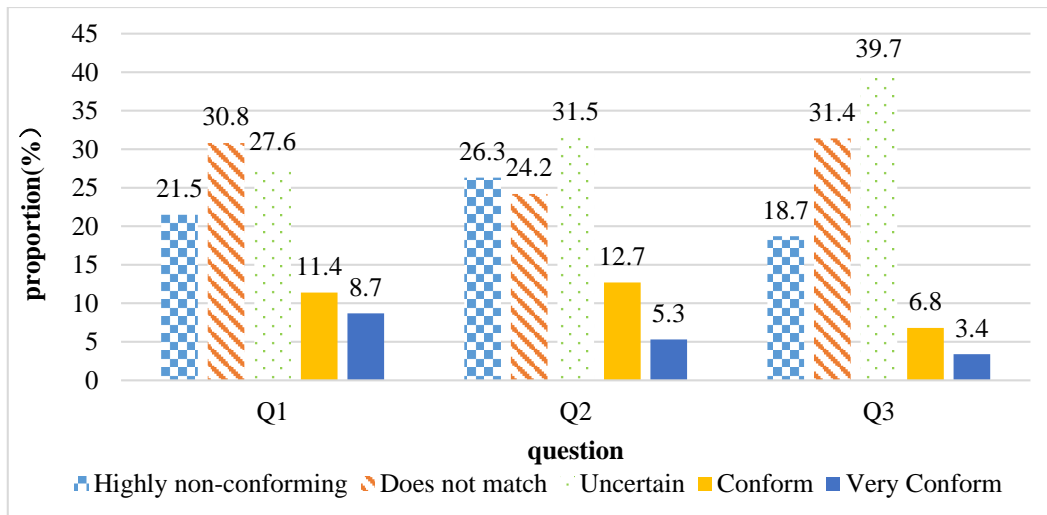


Figure 1: Statistics of school-enterprise cooperation

### 3.2 Evaluation Methods

From the statistics of the survey results, it can be seen that only 11.5% of the students chose the question "Q4: The main body of teaching assessment consists of teachers, enterprises, students, etc.", and 61.5% of the students thought that the main body of teaching assessment is not composed of teachers, enterprises and students. It can be indirectly concluded that universities have a single way of evaluation for students. In the question of "Q5: The result of internship directly affects graduation", 35.2% of students are not sure whether the result of internship will affect graduation or not; in the question of "Q5: Enterprises will evaluate students' internship", 45.8% of students say they are sure that enterprises will not evaluate their internship. In "Q5: Will enterprises evaluate students' internship", 45.8% of students said they were sure that enterprises would not evaluate their internship, and 46.6% of students thought that the result of internship would not directly affect their graduation, while 34.3% of students were not sure whether it would affect their graduation. It can be seen that the school is not accurate in its own positioning in the TT through the IEI, and still thinks that the TT is only the task of the school, and does not fulfill its own obligations in the internship of students, and lacks the whole tracking of students' internship and the evaluation

mechanism of the internship results, which makes the internship of students formal and the enthusiasm of students is not high, as shown in Figure 2.

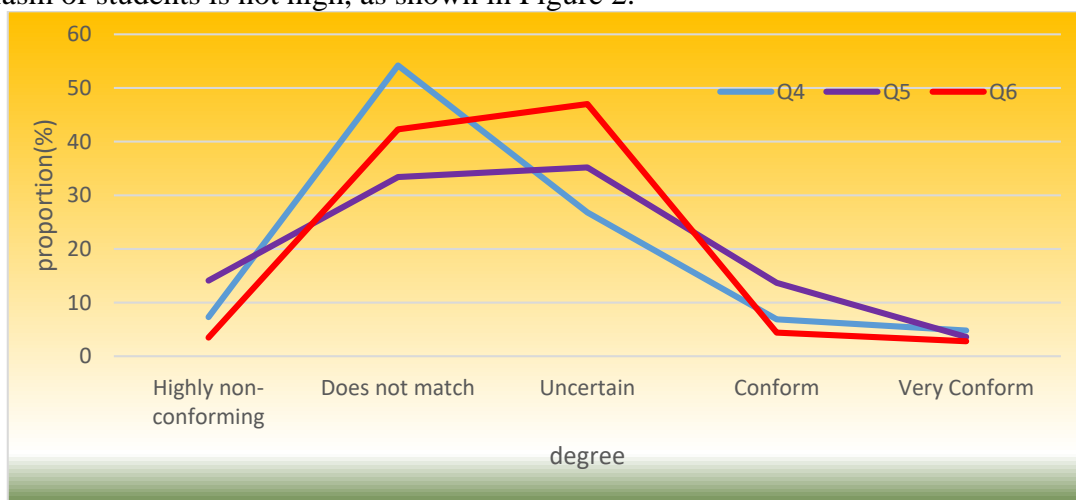


Figure 2: Statistics of assessment and evaluation

Taking the road of IEI, schools and enterprises should jointly develop talent cultivation plan, in order to cultivate a high technology application-oriented profession, the existing form of assessment and evaluation can no longer adapt to the reform of talent cultivation. On the one hand, it has to highlight the students' skills, on the other hand, it is still a closed written examination of systematic theoretical knowledge. Students' skills cannot be fully reflected by an essay, which leads to the fact that the assessment results of some students with strong hands-on skills may not be outstanding, thus losing the opportunity to be interviewed in the school assessment and enterprise assessment [7]. This assessment method leads to the fact that the ability of college graduates will be weaker in today's market competitiveness, which does not meet the requirements of enterprises for jobs and hinders the improvement of teaching quality and long-term healthy development of higher education. The reason is that the process assessment and comprehensive assessment of college students are neglected, and the assessment of the abilities, qualities and skills that students should have is neglected.

### 3.3 Faculty Construction

Although the university ensures the investment in the school's faculty construction funds every year for teachers' quality training and improvement, teaching and research activities, and rewards, the overall teaching funds invested are decreasing as the student population decreases, and the funds for faculty construction are insufficient, accounting for the overall decreasing proportion of the overall teaching funds, only 1.335 million yuan in 2021, accounting for only 11.09%, these inputs are not significant to the overall faculty improvement, as shown in Table 1. And the entire faculty funding specifically for faculty training to enhance the ability of IEI is even less.

Table 1: Teaching expenses statistics

	Expenditure on teaching expenses (million yuan)	Faculty development (million yuan)	Faculty construction ratio
2018	1342.6	163.5	12.18%
2019	1318.4	171.2	12.99%
2020	1275.1	148.7	11.66%
2021	1203.8	133.5	11.09%

## 4. Suggestions and Measures

### 4.1 Suggestions of Professional Talents Cultivation in CAU Based on the IEI

(1) Enterprises change their concepts to deeply participate in the integration of production education

Enterprises should actively participate in the integration of production education into the teaching process of higher education institutions, and should become an important participant in the talent cultivation mode, so as to ensure the smooth implementation of teaching in higher education institutions and also lay a good foundation for the future development of enterprises. Relevant professional enterprises should also learn to be innovative in their concepts and keep up with the times in the process of participation in production education [8].

First, in integrating production education into mainstream practical production, companies should add business management systems, management concepts and their related competitive awareness to the comprehensive teaching of higher education. The pedagogical approach of this concept can formally integrate education into higher education institutions and enterprises and also contribute to the development of the IEI with the support of enterprises [9].

Secondly, the relevant companies should also have a clear understanding of their own production situation in the process of integrating production and education. It is necessary to clarify their own development philosophy, create their own culture and the cultural atmosphere of the whole enterprise, and spread it to the campus through the IEI. For example, enterprise development can create a cultural atmosphere of mutual understanding and mutual learning.

Third, when enterprises participate in research and development in this teaching model, they should also provide funding and their relevant expertise to higher education institutions so as to ensure the effectiveness of activities carried out by both sides.

(2) Aligning the assessment and evaluation system of students with enterprises

Through the survey, we know that the training of students by enterprises only lies in the internship, and enterprises cannot help students in teaching after the internship, and enterprises cannot participate in the evaluation of students' learning quality, and students' graduation evaluation standards are basically made by schools. Theoretical knowledge, for practical operation requirements and standards are not up to the requirements of enterprises, but very few majors have enterprises involved in the graduation assessment, students still can not quickly adapt to the production of enterprises after graduation, so universities in the quality of talent learning still need the depth of enterprises [10-11].

(3) Increase the guarantee and investment of education funds

The implementation of the integration of production and education in CAU cannot be implemented without the support of government guarantee funds, so the government departments also need to establish a reasonable funding guarantee mechanism, which can increase the proportion of the funds for the integration of production and education in the investment of education funds. In addition, the following aspects can be carried out for the financial investment of the integration of production and education in CAU:

First, the proportion of investment in CAU can be increased appropriately to improve the status quo of low investment in CAU, so that CAU can have more education funds to improve the talent cultivation mode of the IEI.

Second, relevant preferential policies and financial support policies should be introduced. Appropriate rewards and encouragement funds should be given to the schools that do a better job in the integration of teaching and learning talent cultivation mode in CAU to encourage the efforts they have made in the process of integration of teaching and learning [12].

## 4.2 Teaching Reform Measures Based on the IEI

### (1) For CAU

CAU should study the curriculum system together with enterprises around students' knowledge base, learning ability and acceptance degree, and clarify the process and arrangement of the curriculum to ensure that students can achieve smooth knowledge connection in the learning process, and can accept and digest theoretical knowledge and operation skills quickly. Enterprises and schools should teach together, and require schools and enterprises to participate in the graduation assessment of students, and enterprises to participate in the formulation of graduation requirements for students, and jointly assess students' performance and practical operation ability with schools, which should achieve the goal of schools and enterprises to jointly develop TT programs suitable for students' learning, practical training, employment and other needs.

### (2) Government side

First, the government, schools and enterprises need to build a platform to develop TT programs. The TT program of CAU cannot be set by schools only, such training program lacks scientific integrity. TT program includes: training objectives, training objectives, curriculum, practical training, employment planning, etc. A training program jointly set by the government, enterprises and schools can solve the problem of overly theoretical school training programs, and add the guiding direction of the government and the needs of enterprise talents to the new training program to create new technical talents suitable for regional economic development. The platform of tripartite cooperation is committed to cultivating high-quality, highly educated and skilled talents, with different training programs for students of different majors, and the curriculum of schools and enterprises under the guidance of the government. On the actual needs of the school and enterprise curriculum can be set according to the actual needs of the combination of theory and practice courses, so that students really go into the social workplace, exercise students in the future in the employment position of practical ability and competitiveness, so that students in the study of theory to master the use of skills.

Second, the construction of the relevant supervision and management system. In the process of training talents in schools and enterprises, the government should act as the "rule maker and supervisor", so as to establish the corresponding supervision and management system. In order to let universities and enterprises cultivate talents in a fair, equal, legal and effective environment, it is very necessary to improve the supervision of government departments. Let schools and enterprises enjoy full rights and responsibilities in all aspects of talent cultivation through the integration of education and industry.

## 5. Conclusion

The research in this paper indicates that the IEI talent cultivation in higher education is a kind of fully integrated with the industrial production practice of enterprises, on the basis of respecting and safeguarding the interests of universities and enterprises, from the cultivation of professional abilities that are adapted to the needs of industries and industries, creating a talent cultivation system that helps integrate theoretical knowledge and social production practice, further enhancing the professionalism of skilled talents, improving vocational application ability. In addition, it can better serve the industry and the economy and society. IEI TT especially focuses on the connection between theory and enterprise practice and the integration of educational resources in order to achieve a win-win situation for multiple groups.

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